

## RELATIONSHIPS AMONG SPECIES GROUPS OF *VARANUS* FROM SOUTHERN SOUTHEASTERN ASIA WITH DESCRIPTION OF A NEW SPECIES FROM VIETNAM

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**Abstract** A large lizard was bought from a Vietnamese in free market in Hekou, Yunnan, bordering Vietnam, on November 15, 1992. It is a new species of *Varanus* and described as follows. In this paper, we also studied the relationships among nine species of *Varanus* according to 15 characters in southern and southeastern Asia, and presented the geographical distribution of nine species.

**Key words** New species, *Varanus vietnamensis*, Relationship, Distribution

### 1 DESCRIPTION OF *Varanus vietnamensis* sp. nov.

**Holotype:** 92001, an adult female, north Vietnam, November 15, 1992.

**Diagnosis:** Dorsal scales almost smooth, insert in rarely keeled scales on back without chevron-shaped, which differs it from *V. nebulosus* (Boulenger, 1885, 1890; Taylor, 1963); it differs from *V. salvator* in not having transverse ocelli marks on back of body (Guenther, 1864; Harrison *et al.*, 1957; Pope, 1935); it differs from *V. irrawardicus* (Yang *et al.*, 1987), *V. griseus* and *V. monitor* (Smith, 1935), in having transverse widened supraoculars.

**Description of type:** A large lizard, with snout-vent length 515 mm, tail length 845 mm; head elongated and oblique forward and pyramidal; length of head 102 mm, head width 48 mm; width of head little more than deep; tip of snout slightly projected, frontal little projected; distance from nostril to eye (abbreviated as NE, 26 mm, ) is 1.73 times as that of nostril to tip of snout (abbreviated as NS, 15 mm); nostril an oblique slit; horizontal diameter of eye equal to that of tympanum. Supralabials 26; scales on back of head irregular and smaller than nuchal scales, and not keeled; supraocular scales 6(left), 7(right), transversely enlarged; pupil oral. Scales on back of nuchal and body, little bulgy, but no apical pit; abdominal scales smooth and cuboid, about 77 transverse row, very larger than dorsal scales in size; scales on limbs smaller than scales on back of body. Tail compressed with cuboid scales ranged cyclically but not keeled and with a low double-toothed crest

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above. ventral scales of 4th toe with 27 transverse rows.

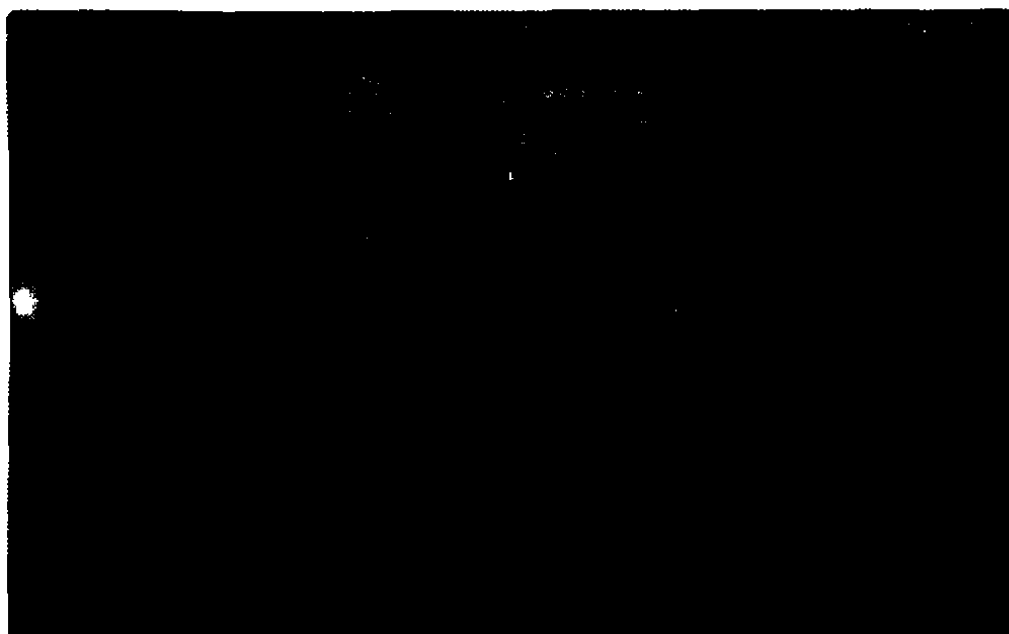


Figure 1 *Varanus vietnamensis*, Holotype (92001), female.

Dark black above, without any transverse band, most of scales blackish, but some scales with yellowish point on posterior half of scale; top of head with two short black straight bars; eyebrow indistinct; supraocular scales yellowish; three transverse yellowish bars on every digits of foot; belly blackish in color; tail without transverse band.

Distribution: presently only know in north Vietnam.

## 2 KEY TO NINE SPECIES OF *Varanus*

- |   |                     |
|---|---------------------|
| 1. supraoculars not transversely widened .....                        | 2                   |
| supraoculars transversely widened .....                               | 4                   |
| 2. NE = NS .....  | <i>irrawardicus</i> |
| NE < NS .....   | 3                   |
| 3. scales on neck and back keeled .....                               | <i>griseus</i>      |
| Scales on neck and back smooth .....                                  | <i>monitor</i>      |
| 4. chevron-shaped marking on neck .....                               | <i>nebulosus</i>    |
| without chevron-shaped marking on neck .....                          | 5                   |
| 5. ocelli marking (black surrounded by yellow) present .....          | <i>salvator</i>     |
| ocelli marking on back absent .....                                   | 6                   |
| 6. NE < NS .....  | 7                   |
| NE > NS .....   | 8                   |
| 7. a U-shaped dark mark on neck .....                                 | <i>dumerili</i>     |
| black transverse band in front of should .....                        | <i>rudicollis</i>   |
| 8. blackish above, some scales with yellowish on posterior half ..... | <i>vietnamensis</i> |
| broad cross bars on back .....  | <i>flavescens</i>   |

### 3 RANGE OF DISTRIBUTION OF NINE SPECIES

Table 1 Range of distribution of nine species

<i>dumerili</i>	Malaya (Indo-Chinese Subregion)
<i>Flavescens</i>	northern India to western Bengal
<i>griseus</i>	regions of N. W. India and westwards through south Asia to Caspian Sea and north Africa
<i>irrawaddicus</i>	southwestern Yunnan(?), Vietnam
<i>monitor</i>	India, Sri Lanka
<i>nebulosus</i>	southern Burma, Thailand, southern Vietnam, Malaya Peninsula
<i>rudicollis</i>	Thailand, southern Burma, Malaya, Sumatra, Borneo, Banka Islands
<i>salvator</i>	Sri Lanka, India, southern China, Vietnam, Burma, Thailand, N. Australia(?), Andaman and Nicobar Islands
<i>vietnamensis</i>	Vietnam and maybe border Yunnan

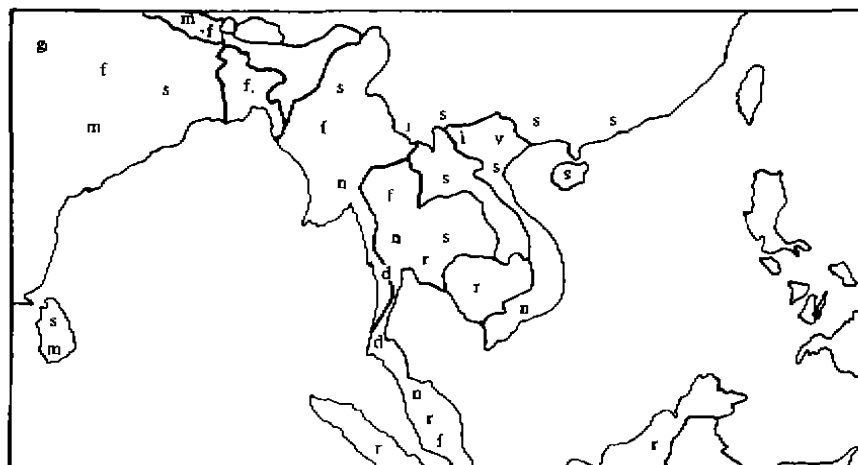


Figure 2 Map of distribution of nine species of *Varanus* in south and southeast Asia according table 1. This map is not the basis of delimitation of boundary.

### 4 ANALYSIS OF 15 CHARACTERS OF NINE SPECIES

#### 4.1 The distribution status of 15 characters in nine species from south and southeast Asia (see table 2)

#### 4.2 Phylogenetic analysis of nine species

The species, *salvator*, that widely distributed in south and southeast Asia, and north Australia, which should be considered to have been widely distributed before the separation of the Gondwana. We think it is more primitive than other eight species. Generally it's six characters should be also primitive for other species.

Among 15 characters, characters 3, 4, 5 are actually three states of one character, position of nostril. State NE>NS from *salvator* which should be an original state, NE=NS and NE<NS are derived states from state NE>NS. So we can get the table 3 and 4 of characters as below.

Table 2 Distribution of 15 character states in nine species of *Varanus*

Characters	Species of <i>Varanus</i>									
	v <sup>2</sup>	r	s	f	n	d	i	m	g	
1. small supraoculars	0	0	0	0	0	0	1	1	1	
2. widened supraoculars	1	1	1	1	1	1	0	0	0	
3. NE < NS	0	1	0	0	1	1	0	1	1	
4. NE = NS	1	0	0	0	0	0	1	0	0	
5. NE > NS	0	0	1	1	0	0	0	0	0	
6. SC < SN <sup>11</sup>	1	1	0	1	0	1	1	0	0	
7. SC > SN	0	0	1	0	1	0	0	1	1	
8. scales on neck and back smooth	1	0	0	0	1	0	1	1	0	
9. scales on neck and back keeled	0	1	1	1	1	1	0	0	1	
10. BTB in front of shoulders	0	1	0	0	0	0	0	0	0	
11. BTB on neck	0	0	0	0	0	1	0	0	0	
12. ocelli (black surrounded by yellow)	0	0	1	0	0	0	0	0	0	
13. chevron-shaped marking on neck	0	0	0	0	1	0	0	0	0	
14. transverse bands on back	0	1	0	0	0	1	0	0	0	
15. transverse bands on tail	0	1	1	1	1	1	0	0	1	

① scales on crown smaller than scales of nuchal (SC < SN). BTB = black transverse band: "0" = absent; "1" = present.

② *vietnamensis* (abbreviate v), *rudicollis* (r), *salvator* (s), *flavescens* (f), *nebulosus* (n), *dumerili* (d), *brawardicus* (i), *monitor* (m), *griseus* (g).

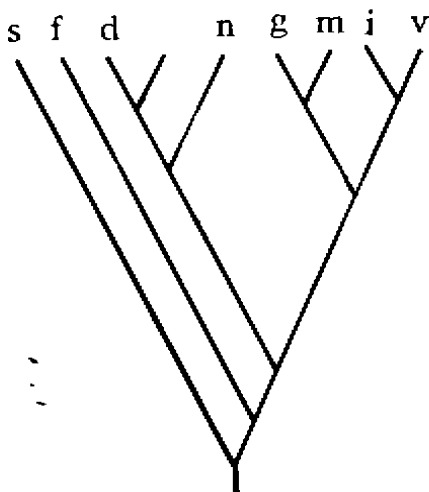
Table 3 Summary of polarity of character states of nine species of *Varanus*

Characters	Primitive	Derived
1. supraoculars	small	transverse widened
2. NE and NS	NE > NS	NE = NS or NE < NS
3. SC and SN	SC > SN	SC < SN
4. scales on neck and back	keeled	smooth
5. BTB in front of shoulder	absent	present
6. BTB on neck	absent	present
7. ocelli mark	absent	present
8. chevron-shaped mark	absent	present
9. transverse band on back	absent	present
10. transverse band on tail	present	absent

Table 4 Distribution of derived character in nine species of *Varanus* in southern Asia

Characters	Species									
	v	r	s	f	n	d	i	m	g	
1. supraoculars	0	0	0	0	0	0	1	1	1	
2. NE and NS	1	1	0	0	1	1	1	1	1	
3. SC and SN	1	1	0	1	0	1	1	0	0	
4. scales on neck and back	1	0	0	0	0	0	1	1	0	
5. BTB in front of shoulders	0	1	0	0	0	0	0	0	0	
6. BTB on neck	0	0	0	0	0	1	0	0	0	
7. ocelli mark on back	0	0	1	0	0	0	0	0	0	
8. chevron-shaped mark on neck	0	0	0	0	0	1	0	0	0	
9. transverse bands on back	0	1	0	0	0	1	0	0	0	
10. transverse bands on tail	1	0	0	0	0	0	1	1	0	

0 = primitive state; 1 = derived state. Full definition of characters in Table 1

Figure 3 Proposed phylogenetic relationships among nine species of *Varanus*

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## 南亚和东南亚巨蜥居群的种间亲缘和越南一新种描述

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**摘要** 1992年11月15日从云南省河口县城自由市场的一位越南人手中买得一雌性巨蜥, 经鉴定为一新种, 定名为越南巨蜥 *Varanus vietnamensis*。

**鉴别特征:** 新种背部鳞片光滑, 仅在后半部插有极少的起棱鳞片, 不同于 *V. nebulosus* (Boulenger, 1885, 1890; Taylor, 1963); 新种不同于 *V. salvator* 在于其背部没有眼斑状横斑带 (ocelli marks) (Guenther, 1864; Harrison 等, 1957; Pope, 1935); 不同于 *V. irrawardicus* (Yang 等, 1987), *V. griseus* 和 *V. monitor* (Smith, 1935) 在于有 6—7 个横向扩大的眼上鳞。

文中运用了 15 个外部性状对产于南亚, 东南亚大陆及岛屿共 9 个种 (含新种) 的种间亲缘关系进行了研究, 结果认为, 种间亲缘关系的亲疏与分布地区相距的远近成正相关。

**关键词** 新种, 越南巨蜥, 亲缘关系, 分布

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